

Real Numbers

Lesson 1: Introduction to Radicals

NUMBER SYSTEMS:

Natural Numbers (N): counting numbers.

$$\{1, 2, 3, 4, \dots\}$$

Whole Numbers (W): The natural numbers and 0.

$$\{0, 1, 2, 3, 4, \dots\}$$

Integers (I): The positive and negative Whole Numbers.

$$\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$$

Rational Numbers: any number that can be written as a $\frac{m}{n}$, where m and n are integers.
↳ fraction

Irrational Numbers: Any Number that cannot be written as a fraction.

Write the following Rational Numbers as Decimals:

a) $\frac{5}{1} = 5$

b) $\frac{11}{8} = 1.375$

c) $-\frac{23}{99} = -0.2323232323\dots$

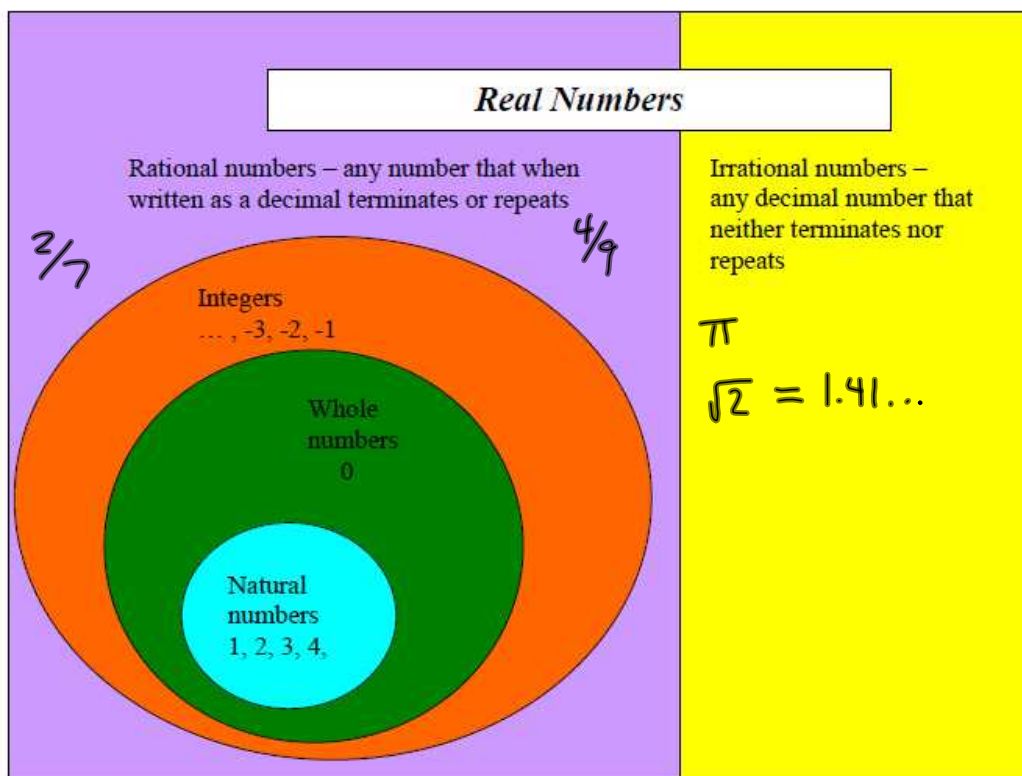
Rational Numbers are what type of decimals?

Integers, Any decimal that ends,
Any Repeating Decimal

Decimal Definition of an Irrational Number:

A Non-terminating, Non-Repeating Decimal.

Real Numbers: The sets of all Irrational and Rational Numbers.



Example 1: Label the following as Rational or Irrational.

- a) $\sqrt{3} = 1.732050808...$ Irrational b) $\sqrt{16} = 4$ Rational c) $\sqrt{20} = 4.472135955..$ Irrational
- d) $\sqrt{1.44} = 1.2$ Rational e) $\sqrt{\frac{4}{9}} = \frac{2}{3} = 0.66666...$ Rational f) $\sqrt{\frac{4}{5}} = 0.894427191...$ Irrational

Example 2: Put a check mark in the box that describes the number given. (Some numbers may require more than one check.)

Types of Numbers	Real	Irrational	Rational	Integer	Whole	Natural
-5	✓		✓	✓		
0	✓		✓	✓	✓	
0.12112111...	✓	✓				
$\frac{2}{3}$	✓		✓			
-0.75	✓		✓			
$\sqrt{13}$	✓	✓				

$\sqrt{-1} = i \leftarrow \text{imaginary}$

Introduction To Radicals

($n \geq 2$)

A **Radical** is an expression of the form $\sqrt[n]{a}$ where n is a natural number, is a radical. If n is even, the expression represents only the positive root.

$$\sqrt[n]{a}$$

n - index

a - radicand

Types of Roots

Square Root of x (\sqrt{x}): What # times itself to = x .

$$\sqrt{25} = 5$$

$$-\sqrt{1.21} = -1.1$$

$$\sqrt{7} = 2.645751311$$

Cube Root of x ($\sqrt[3]{x}$): What # times itself 3 times = 's x .

$$\sqrt[3]{27} = 3$$

$$\sqrt[3]{-15} = -2.46621..$$

$$\sqrt[3]{5.21} = 1.733588...$$

Fourth Root of x ($\sqrt[4]{x}$): What # times itself 4 times = 's x .

$$\sqrt[4]{256} = 4$$

$$-\sqrt[4]{64} = -2.828427...$$

$$\sqrt[4]{6} = 1.56508...$$

n^{th} Root of x ($\sqrt[n]{x}$): What # times itself n times = 's x

$$\sqrt[7]{61} = 1.799066096...$$

$$\sqrt[5]{-32} = -2$$

HW: 1) Worksheet Attached

2) Pg 206: 2,3; Pg 211: 3,4